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<b>PRE-APPEAL BRIEF REQUEST FOR REVIEW</b>		Docket Number (Optional)  083847-0198	
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]  on _____  Signature _____  Typed or printed name _____	Application Number  10/689,547	Filed  10/21/2008	
	First Named Inventor  Percy Van Crocker		
	Art Unit  1795	Examiner  Ruggles	
<p>Applicant requests review of the final rejection in the above-identified application. No amendments are being filed with this request.</p> <p>This request is being filed with a notice of appeal.</p> <p>The review is requested for the reason(s) stated on the attached sheet(s). Note: No more than five (5) pages may be provided.</p> <p>I am the</p> <div style="display: flex; justify-content: space-between;"><div style="width: 45%;"><p><input type="checkbox"/> applicant/inventor.</p><p><input type="checkbox"/> assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)</p><p><input checked="" type="checkbox"/> attorney or agent of record. 40,153 Registration number _____</p><p><input type="checkbox"/> attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____</p></div><div style="width: 50%; text-align: center;"><div style="margin-bottom: 10px;"> _____ Signature Steven Rutt _____ Typed or printed name</div><div style="margin-bottom: 10px;">202-672-5351 _____ Telephone number</div><div>December 15, 2008 _____ Date</div></div></div> <p>NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.</p>			
<input type="checkbox"/> *Total of _____ forms are submitted.			

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Inventor: Crocker et al.  
Title: Nanometer-Scale Engineered Structures...  
Serial No. 10/689,547  
Filed: 10/21/2003  
Examiner: Ruggles  
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## **REQUEST FOR PRE-APPEAL BRIEF CONFERENCE**

### **I. INTRODUCTION**

**One substantive issue remains: *prima facie* obviousness. The prior art cited by the Examiner fails to disclose or suggest at least one crucial element in the broadest claims. Moreover, the prior art primary reference directly teaches away.**

The claimed invention relates generally to nanoscale additive photomask repair. Photomasks are commonly used in the semiconductor industry. Photomasks continue to become more complex and expensive as device size shrinks well into the nanoscale (e.g., smaller than 100 nm). Hence, a market need exists to be able to repair photomasks which are defectively made. The Applicant, NanoInk, Inc., has invented a fundamentally new approach to solve problems with nanoscale photomask repair.

Two general types of repair are known: additive and subtractive. In additive photomask repair, a defective photomask is provided, and a material is added to the defect to fix the mask. Such repair is not trivial. The material added must be specially formulated to be capable of being deposited and must have suitable optical properties and thickness (e.g., suitable refractive index). Artisans in the past commonly used vacuum and beam processes for additive repair. In contrast, the applicants herein claim a new, non-vacuum, sol-gel approach to additive repair. Moreover, additive repair stands in contrast to the generally easier methods of subtractive repair, wherein material from a defective photomask must be removed. In subtractive repair, no specially formulated material is need. The additive and subtractive processes are not interchangeable. Industry needs better additive repair methods much more than it needs better subtractive repair, and NanoInk has developed a new method to address this need.

Rejected independent claim 1, the focus here, states:

*1. A method for additive mask repair in the semiconductor industry with fine control over lateral dimensions and height comprising:  
providing a defective mask in need of additive repair,  
depositing material to the defective mask by direct write nanolithography from a tip for additive repair, wherein the tip is an atomic force microscope tip and wherein the material coats the tip, and wherein the material is a sol-gel material  
converting the deposited material to a solid oxide. (Emphases Added)*

Independent claim 1 has been finally rejected for only one reason: obviousness. In formulating the obviousness rejection, the Examiner has first relied on six references: Lewis (Applied Physics Letters), Miller (6,270,946), Park (5,871,869), Starodubov (5,972,542), Ukrainczyk (6,253,015), and Mancevski (6,146,227). *See* office action page 4. The Examiner has also issued a supplemental obviousness rejection based on these six references but also adding two references to Mirkin (2003/0162004 and 2004/0142106).<sup>1</sup> *See* office action page 12.

## **II. MISSING ELEMENT**

No *prima facie* obviousness is present because none of the cited references teach “providing a defective mask in need of additive repair” or “additive mask repair.” Hence, a “missing element” is present, and the claimed invention is not arrived at even if the references are combined for sake of argument.

The primary reference Lewis teaches subtractive repair, not additive repair.

The second reference Miller teaches a deposition process which is an alternative to photomask methods. No photomask repair is described.

The third and fourth references, Park and Starodubov, teach a method of manufacturing a photomask, not repair.

The fifth reference Ukrainczyk teaches an optical waveguide.

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<sup>1</sup> The Applicants reserve the right to swear behind the two Mirkin references based on the filing dates of this application and the filing dates in Mirkin, although this issue is deemed inapposite for purposes of this Request.

The final, sixth, reference Mancevski teaches a carbon nanotube MEMS device which can be used in any number of applications including mask repair. However, the reference does not focus on additive repair.

In addition, the two Mirkin references cited in the second rejection also fail to teach these elements.

In view of the large differences between subtractive repair and additive repair, the Applicants respectfully submit that this missing element is material and evidence of patentability. Moreover, the differences between the claims and the cited reference do not reflect mere optimization but rather address a recognized difficult problem in the art. The Applicants have already presented literature in the record which confirms that, compared to subtractive repair, additive repair “has proven more difficult.” See Applicants June 4, 2007 Rule 116 Amendment, page 16 and attached reference.

### **III. TEACHING AWAY**

Moreover, the primary reference Lewis teaches away. Lewis teaches a subtractive process which requires use of a very different material than a sol-gel material as presently claimed. One would not use sol-gel material for subtractive repair. Sol-gel materials are reactive materials which condense and upon cure form solid structures. They are not materials to remove matter like an etchant, as Lewis teaches.

In particular, claim 1 requires depositing “a sol-gel material” and “converting the deposited material to a solid oxide.” Whereas applicants claim a solidification step, Lewis teaches the prevention of solidification:

*“Etchant which leaves the pipette forms globules which solidify on the surface. This hinders the writing process. Globule formation and solidification can be prevented by keeping the surface and tip at absolute humidity.” See page 2690, left column, bottom.*

In other words, the deposited materials in the claim and the prior art are totally opposite. In the claim, the materials solidify, whereas in Lewis, the materials are prevented from

solidifying. The claim requires use of sol-gel materials which are anathema to Lewis, which teaches a non-solidification system.

The secondary reference Miller also teaches away, directing one skilled in the art to use the process “without using a mask.” See col. 1, lines 42-47. Moreover, the difunctional molecules used in Miller teach away from sol-gel materials as presently claimed as sol-gel materials require network formation which requires more than two functional sites per molecule (e.g., three or four functional, reactive groups are needed to form a solid network.).

Clearly, the Examiner has adopted a hindsight approach in not picking any references which directly relate to additive repair. One of ordinary skill in the art faced with the problems of photomask repair would not turn to these references to solve the problem – particularly a reference like Lewis which teaches etchants.

#### **IV. NO MOTIVATION TO COMBINE REFERENCES**

Finally, no motivation to combine references is present, particularly with respect to Lewis and Miller. Injecting the teachings of Miller into Lewis would destroy Lewis – one cannot do subtractive repair with the materials of Miller. Similarly, injecting the teachings of Lewis into Miller would destroy Miller – one cannot do a deposition and multilayer process with the materials of Lewis (etchants).

#### **V. MISINTERPRETATION**

Respectfully, a key misinterpretation in the Examiner’s reasoning in the record to date appears to be an overemphasis on the breadth of the teachings of Lewis. For example, at the end of the Lewis article (page 2691), a variety of improvements are noted including ink jet printing, altering the tip, including improving the geometry of the tip, and adapting the deposited material with respect to flow, capillary osmosis, lubrication, and wetting properties. However, none of these improvements suggest additive photomask repair. The Examiner has misinterpreted the reference in suggesting that the wildly broad speculations in Lewis would have been applied to solve the very focused issue of additive photomask repair. The Applicants respectfully submit

that Lewis is silent about additive photomask repair for a reason – the teachings in Lewis are not applicable to additive repair.

**VI. INDEPENDENT CLAIM 40 AND DEPENDENT CLAIMS**

The position taken above with respect to independent claim 1 is similar to that also taken for independent claim 40 except that the preamble is different and that a broader term, scanning probe microscope, is used compared to the AFM in claim 1.

Several dependent claims present particularly important issues for patentability. For example, the prior art does not teach or suggest the high structures of 30 or 45 or more nm, as found in claims 21-24. Lewis does not teach how to build high structures. In addition, claims 98-99 recite exclusion of voltage, and the primary reference suggests use of voltage.

In sum, the Applicants respectfully submit that an appeal brief should not need to be filed based on this record.


**VII. SPECIFICATION**

Finally, the Examiner took issue with additional formality points in the specification. The Applicants traverse that such specification amendment is needed. The minority specification issues raised by the Examiner can be easily fixed as needed without further delay.

Respectfully submitted,

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